

AMENDMENT UNDER 37 C.F.R. § 1.111
USSN 09/892,845

B1
Canx

a coil embedded in an outer molding, said coil being constructed by winding a conducting wire onto said bobbin, and

a1
Canx

means for preventing sulfur compounds from permeating said bobbin and said outer molding and attendantly reducing the formation of sulfur compounds on a surface of said conducting wire, thereby suppressing the reduction in adhesive strength of an electrically-insulating layer to said conducting wire, wire breakage, and short circuiting between said conducting wires,

said preventing means comprising forming said bobbin and said outer molding of an electrically-insulating material resistant to permeation by sulfur compounds.

SUB
B2

3. (Amended) An electromotive device used in an oil, said electromagnetic device comprising:

an outer casing;

a moveable shaft supported by said outer casing;

a1

a bobbin disposed inside said outer casing so as to be disposed around said moveable shaft on a common axis with said moveable shaft; and

a coil embedded in an outer molding, said coil being constructed by winding a conducting wire onto said bobbin,

an electrically-insulating layer coated on said conducting wire,

B2
Cont
A3
Carl

AMENDMENT UNDER 37 C.F.R. § 1.111
USSN 09/892,845

a protective layer coated on said electrically-insulating layer, and
means for preventing sulfur compounds from permeating said protective
layer and attendantly reducing the formation of sulfur compounds on a surface of said
conducting wire, thereby suppressing reduction in adhesive strength of the electrically-
insulating layer to the conducting wire, wire breakage, and short circuiting between said
conducting wires,

said preventing means comprising forming said protective layer of an
electrically-insulating material resistant to permeation by sulfur compounds.

SUB
B3

5. (Amended) An electromotive device used in an oil, said electromagnetic
device comprising:

an outer casing;

a moveable shaft supported by said outer casing;

A3

a bobbin disposed inside said outer casing so as to be disposed around said
moveable shaft on a common axis with said moveable shaft;

a coil embedded in an outer molding, said coil being constructed by
winding a conducting wire onto said bobbin,

a high-temperature solder layer coated on said conducting wire,

a protective layer coated on said high-temperature solder layer, and

B3
cont
A3
cont

AMENDMENT UNDER 37 C.F.R. § 1.111
USSN 09/892,845

means for preventing sulfur compounds from permeating said protective layer and attendantly reducing the formation of sulfur compounds on a surface of said conducting wire, thereby suppressing reduction in adhesive strength of an electrically-insulating layer to the conducting wire, wire breakage, and short circuiting between said conducting wires,

said preventing means comprising forming said protective layer of an electrically-insulating material resistant to permeation by sulfur compounds.

REMARKS

Claims 1-6 have been examined. Claims 1, 3, and 5 have been amended. No new subject matter is added. Reconsideration and allowance of all claims are respectfully requested in view of the following remarks.

Objections

The Examiner has objected to Figures 4-12. Applicants are submitting for approval under separate cover proposed redlined drawing corrections. Applicants respectfully submit that the Examiner's objections regarding Figures 4-12 have been addressed and that Figures 4-12 have been corrected accordingly. The submitted corrections are believed to obviate the Examiner's objections.

Rejection of claims 1-2 under 35 U.S.C. § 103(a)

The Examiner rejects claims 1-2 under 35 U.S.C. § 103(a) as being unpatentable over the admitted prior art (APA) in view of Ryang et al. (U.S. Patent No. 6,159,600 hereinafter "Ryang"). Applicants respectfully traverse the rejection.

The Examiner asserts that Ryang teaches providing a protective layer composed of an electrically-insulating material resistant to permeation by sulfur compounds. Applicants respectfully disagree. Applicants submit that Ryang does not teach or suggest a protective layer composed of an electrically-insulating material resistant to permeation by sulfur compounds; rather Ryang teaches that in the high field intensity environment of

AMENDMENT UNDER 37 C.F.R. § 1.111
USSN 09/892,845

an electrical motor, an insulating resin coating is subject to breakdown from oxide erosion resulting from surface corona and embedded corona (see col. 1, lines 32-36). Specifically, Ryang teaches that high field intensity leads to the generation of oxygen plasma that oxidizes and breaks down an insulating resin (see col. 1, lines 36-38). Ryang teaches solving this problem by providing an insulating resin with a coating that comprises an oxygen plasma resistant polymer (see col. 3, lines 1-39). In addition, Ryang teaches providing an insulating resin with corona resistance (see col. 1, lines 38-42).

In comparison, Applicants identify and solve a different problem by providing a different solution. Applicants teach that when a conventional stepping motor 1 is mounted to an automobile continuously variable transmission, it is entirely immersed in oil, which contains sulfur and organosulfur compounds (See page 4, lines 13-26). An example of a problem with immersing the stepping motor 1 in the oil is that the sulfur and the organosulfur compounds in the oil permeate the bobbins 53, the outer moldings 54, and the electrically-insulating layer 52, thereby reaching the copper wire 51 (See id.). As a result, chemical reactions occur at the surface of the copper wire 51, giving rise to a state of decreased adhesive strength of the electrically-insulating layer 52 to the copper wire 51 (See id.). Another problem is that when the temperature of the oil becomes greater than vaporization temperatures of volatile components in the oil due to heat generated by the coils 7, the electrically-insulating layer 52 of the conducting wires 50 is

AMENDMENT UNDER 37 C.F.R. § 1.111
USSN 09/892,845

more likely to be permeated by sulfur and there is a greater likelihood of short circuiting occurring between the conducting wires 50 (See page 5, lines 9-14).

Applicants solve at least these problems by providing at least “means for preventing sulfur compounds from permeating said bobbin and said outer molding,” as recited in Applicants’ claim 1. Specifically, Applicants teach solving these problems by providing “preventing means comprising forming said bobbin and said outer molding of an electrically-insulating material resistant to permeation by sulfur compounds,” as further recited in Applicants’ claim 1.

Because Ryang does not teach or suggest preventing sulfur compounds from permeating the bobbin and outer molding in order to prevent sulfur from reaching the electrically-insulating layer and, thus the conducting wire, Applicants submit that Ryang does not teach or suggest all of the recitations of Applicant’s claim 1. Thus, Applicants’ claim 1 is patentable over Ryang and the rejection should be withdrawn.

In addition, Applicants submit that claim 2 is also patentable over Ryang at least by virtue of its dependency on independent claim 1 and the rejection of claim 2 should also be withdrawn.

Rejection of claims 3-4 under 35 U.S.C. § 103(a)

The Examiner rejects claims 3-4 under 35 U.S.C. § 103(a) as being unpatentable over the admitted prior art (APA) in view of Miyao et al. (U.S. Patent No. 5,691,058 hereinafter “Miyao”). Applicants respectfully traverse the rejection.

AMENDMENT UNDER 37 C.F.R. § 1.111
USSN 09/892,845

The Examiner asserts that Miyao teaches a protective layer composed of an electrically-insulating material resistant to permeation by sulfur compounds. Applicants respectfully disagree. Applicants submit that Miyao does not teach or suggest a protective layer coated of an electrically-insulating material that is resistant to permeation by sulfur compounds; rather Miyao teaches a sheet material and a prepreg for electrical insulation using glass flakes to provide an electrical insulation layer having higher partial discharge resistance and dielectric resistance (See col. 1, lines 62-67, see also col. 2, lines 26-38, see also the “Abstract”).

In comparison, Applicants identify and solve a different problem by providing a different solution. Applicants solve the problem of permeation of sulfur into the electrically-insulating layer, which results in a chemical reaction at the surface of the conducting wire, by providing at least “means for preventing sulfur compounds from permeating said protective layer,” as recited in Applicants’ claim 3 (See also pages 4-5). Specifically, Applicants teach solving these problems by providing “preventing means comprising forming said protective layer of an electrically-insulating material resistant to permeation by sulfur compounds,” as further recited in Applicants’ claim 3.

Because Miyao does not teach or suggest preventing sulfur compounds from permeating a protective layer of the insulating layer in order to prevent sulfur from permeating the electrically-insulating layer and, thus reaching the conducting wire, Applicants submit that Miyao does not teach or suggest all of the recitations of

AMENDMENT UNDER 37 C.F.R. § 1.111
USSN 09/892,845

Applicant's claim 3. Thus, Applicants' claim 3 is patentable over Miyao and the rejection should be withdrawn.

In addition, Applicants submit that claim 4 is also patentable over Miyao at least by virtue of its dependency on independent claim 3 and the rejection of claim 4 should also be withdrawn.

Rejection of claims 5-6 under 35 U.S.C. § 103(a)

The Examiner rejects claims 5-6 under 35 U.S.C. § 103(a) as being unpatentable over the admitted prior art (APA) in view of Bolon et al. (U.S. Patent No. 4,388,371 hereinafter "Bolon"). Applicants respectfully traverse the rejection.

The Examiner asserts that Bolon teaches a high-temperature solder layer coated on the copper wire and a protective layer that is composed of an electrically-insulating material resistant to permeation by sulfur compounds. Applicants respectfully disagree. Applicants submit that Bolon does not teach or suggest a high-temperature solder layer coated on the copper wire and a protective layer that is composed of an electrically-insulating material resistant to permeation by sulfur compounds; rather Bolon teaches a coated conductor 10 comprising a base wire 11 of metal, a base coat 12 of electrically-insulating, heat resistant, cured resin, and a bondable acrylic polymer overcoat 14 (See col. 7, lines 9-15). Bolon teaches using the bondable acrylic polymer overcoat to provide a self-bondable, electrically insulated magnet wire that has excellent adhesive or bonding strength between wire strands or turns (See col. 2, lines 65-68). In addition, Bolon

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AMENDMENT UNDER 37 C.F.R. § 1.111
USSN 09/892,845

teaches that the acrylic polymers are resistant to the fluorinated hydrocarbons commonly used in hermetic motors (See col. 3, lines 32-34), however, Bolon does not teach or suggest using a material that is resistant to permeation by sulfur compounds.

In comparison, Applicants identify and solve a different problem by providing a different solution. Applicants solve the problem of permeation of sulfur into the electrically-insulating layer, which results in a chemical reaction at the surface of the conducting wire, by providing at least “means for preventing sulfur compounds from permeating said protective layer,” as recited in Applicants’ claim 5 (See also page 11, lines 20-29). Specifically, Applicants teach solving these problems by providing “preventing means comprising forming said protective layer of an electrically-insulating material resistant to permeation by sulfur compounds,” as further recited in Applicants’ claim 5.

Because Bolon does not teach or suggest preventing sulfur compounds from permeating a protective layer of the insulating layer in order to prevent sulfur from permeating the electrically-insulating layer and, thus reaching the conducting wire, Applicants submit that Bolon does not teach or suggest all of the recitations of Applicant’s claim 5. Thus, Applicants’ claim 5 is patentable over Bolon and the rejection should be withdrawn.

In addition, Applicants submit that claim 6 is also patentable over Bolon at least by virtue of its dependency on independent claim 5 and the rejection of claim 6 should also be withdrawn.


AMENDMENT UNDER 37 C.F.R. § 1.111
USSN 09/892,845

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned attorney at the telephone number listed below.

Applicants hereby petition for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,

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